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English Translation of Japanese Patent (JP 01267002A)

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PTO 2005-5734

Japanese Kokai Patent Application
No. Hei 1[1989]-267002

DOOR AND CONSTRUCTION METHOD THEREFOR

Eugene X. Anglehart

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DOOR AND CONSTRUCTION METHOD THEREFOR

[Tobira oyobi sono kosei hoho]

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Applicant:	Eugene X. Anglehart

[Amendments have been incorporated into the text of the translation. The amendment to this patent is a clean copy of figures only. No changes were made to the text.]

Claims

1. As a door construction method,
a construction method that includes:
 - a. a step for adhering multiple lumber tie plates of roughly equal length together side-by-side, with the grain of the adhered lumber tie plates arranged in opposite directions,
 - b. and that includes a step for forming at least one open part that passes cuts across said lumber tie plates,

c. and for inserting a spline into said open part.

2. A construction method such that said lumber tie plate has side surfaces that are no more than 63.5 mm (2-1/2 inches) wide and parallel, in the door construction method described in Claim 1.

3. A construction method such that two open parts – said one open part near one end of said lumber tie plate and a second open part near the opposite ends of said lumber tie plate – are formed, in the door construction method described in Claim 1.

4. A construction method such that said open part is a hole, in the door construction method described in Claim 1.

5. A construction method such that said open part is a slot, in the door construction method described in Claim 1.

6. A construction method such that said spline is metal, in the door construction method described in Claim 1.

7. A construction method such that said spline is adhered inside said open part, in the door construction method described in Claim 1.

8. In the door construction method described in Claim 5,

d. a construction method provided with an additional step in which a wooden plug is inserted into each end of said open part and said metal spline is hidden by this.

9. In the door construction method described in Claim 6,

a construction method provided with an additional step in which said [sic] additional lumber tie plate is adhered to the lateral edge enclosing said open part, said metal spline is accepted matched with the end of said open part, and said additional lumber tie plate will have a stop hole to hide it because of this.

10. In the door construction method described in Claim 1,

a construction method that additionally includes: d. a step for polishing one side of said lumber tie plate to a finished state and producing a semi-finished door product with this,

e. a step for attaching a template that has a guide groove on the opposite side of said semi-finished door product from said finished side,

f. a step for placing said semi-finished door product on a router that has a table and a cutter so that a guide pin that projects upward from said table of said router locks in said guide groove of said template, [and]

(g) a step for moving said semi-finished door product so that said guide pin will remain in said guide groove and by this, said [sic] pattern delineated by said guide groove of said template will be reproduced on said semi-finished door product by said cutter of said router.

* [The numbers in the right margin indicate pagination of the original foreign text.]

11. As the door,

a. a door that includes multiple lumber tie plates no more than 6.35 mm (2-1/2 inches) thick bonded side-by-side to each other, where the grain of adjacent lumber tie plates is arranged in opposite directions, said lumber tie plates have at least one open part that extends across them in which a spline is furnished.

12. A door such that said lumber tie plates are roughly the same length, in the door described in Claim 11.

13. A door such that said lumber tie plates are roughly the same width, in the door described in Claim 11.

14. A door such that said open part is a hole, in the door described in Claim 11.

15. A door such that said open part is a slot, in the door described in Claim 11.

16. A door such that said spline is metal, in the door described in Claim 11.

17. A door such that said lumber tie plates are adhered together, in the door described in Claim 11.

18. A door such that said spline is adhered inside said open part, in the door described in Claim 11.

19. A door such that a wooden plug is placed in each end of said open part and said metal spline is hidden by them, in the door described in Claim 16.

20. A door such that a first open part near one end of said lumber tie plate and a second open part near the opposite end of said lumber tie plate are furnished, in the door described in Claim 1.

21. A door such that

a. it includes multiple lumber tie plates that are adhered together side-by-side, that are no more than 63.5 mm (2-1/2 inches) wide, and have roughly the same length and depth; the grain of adjacent lumber tie plates is arranged in opposite directions, and in said lumber tie plates, there is a first matching slot that extends across it at one end and a second matching slot that extends across it at the opposite end of said lumber piece,

b. and that includes a wooden spline placed in each of said slots.

22. As the door, a door

a. that includes multiple lumber tie plates that are adhered together side-by-side, that are no more than 63.5 mm (2-1/2 inches) wide, and have roughly the same length and depth; the grain of adjacent lumber tie plates is arranged in opposite directions, and in said lumber tie plates, there is a first matching hole that extends across it near one end and a second matching hole that extends across it near the opposite end of said lumber tie plate,

b. and it includes a metal spline placed in each of said holes,

c. and a wooden plug that is placed in each end of said holes and that hides said metal spline with that.

23. A door,

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a. that includes multiple lumber tie plates that are adhered together side-by-side, that are no more than 63.5 mm (2-1/2 inches) wide, and have roughly the same length and depth; the grain of adjacent lumber tie plates is arranged in opposite directions, and in said lumber tie plates, there is a first matching hole that extends across it near one end and a second matching hole that extends across it near the opposite end of said lumber tie plate,

b. and that includes a metal spline placed in each of said holes,

c. and said additional lumber tie plate adhered to the side edge that includes said hole, said metal spline is accepted matched with the end of said hole and is hidden by said additional lumber tie plate has a stop hold.

24. A door construction method

a. that includes a step for adhering multiple lumber tie plates, each of which has a width of no more than 63.5 mm (2-1/2 inches) and roughly the same length, together side-by-side, with the grain of adjacent lumber tie plates arranged in opposite directions,

b. and that includes a step for forming at least two slots – a first slot in one end of said lumber tie plate and a second slot in the opposite end of said lumber tie plate – across said lumber tie plate,

c. and a step for inserting a metal spline into each of said slots.

25. A door construction method

a. that includes a step for adhering multiple lumber tie plates, each of which is no more than 63.5 mm (2-1/2 inches) wide and roughly the same length, together side-by-side, with the grain of adjacent lumber tie plates arranged in opposite directions,

b. that includes a step for forming at least two holes – a first hole near one end of said lumber tie plate and a second hole near the opposite end of said lumber tie plate – across said lumber tie plate,

c. a step for inserting a metal spline into each of said holes,

d. and a step for inserting a wooden plug into each end of said holes and hiding said metal spline with them.

26. A door construction method,

a. that includes a step for adhering multiple lumber tie plates, each of which is no more than 63.5 mm (2-1/2 inches) wide and roughly the same length, together side-by-side, with the grain of adjacent lumber tie plates arranged in opposite directions,

b. and that includes a process for forming at least two holes – a first hole near one end of said lumber tie plate and a second hole near the opposite end of said lumber tie plate, across said lumber tie plate,

c. a process for inserting a metal spline into each of said holes,

d. and a process for adhering an additional lumber tie plate of the same depth, width and length and that has a stop hole for accepting said metal spline at each end of said holes and hiding said metal spline with that.

27. For the door construction method described in Claim 22, 23 or 24,

a construction method that includes: e. a step for polishing one side of said lumber tie plate to a finished state and producing a semi-finished door product by that,

f. a step for attaching a template that has a guide groove to the opposite side of said semi-finished door product from said finished side,

g. a process for placing said semi-finished door product on a router that has a table and a cutter so that a guide pin that projects upward from the table of said router locks into said guide groove of said template,

h. and a step for moving said semi-finished door product so that said guide pin will stay in said guide groove, and because of this, said pattern delineated by said guide groove of said template will be reproduced on said semi-finished door product by said cutter of said router.

Detailed explanation of the invention

Industrial application field

The present invention relates to a door construction method, such as for a cupboard door.

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Prior art

With cupboard doors made from a single piece of lumber, warping in both length and width directions is unavoidable. To overcome this problem, a construction method for cupboard doors using five pieces of lumber has been developed by the industry, and four pieces of lumber are used to form a rectangular frame. The lumber pieces must be finished with a router prior to assembly in order to form a pattern that is visible when the lumber is assembled. Once the frame is formed, yet another lumber piece is inserted into the frame to serve as the center panel. However, there are many disadvantages to this type of construction and there are adverse effects on the aesthetic appearance of the cupboard door.

Problems to be solved by the invention

One general form of aesthetic shortcoming relates to the bonding of the frame component elements. Four bond locations must be cut out to form one frame. The cutting of these bond

locations requires a large amount of effort, and no small number of parts of all the bond locations are cut with gaps remaining, regardless of the skill of the worker. Even when the bond locations are cut as accurately as humanly possible, there is the possibility of still encountering gaps at a later time due to contraction of the lumber. With contraction, or as the lumber dries, [gaps] are also present in the center panel, which has a tendency to become loose and unsteady.

Another general form of aesthetic shortcoming relates to finishing of the lumber surface. The grain of the four pieces of lumber that form the frame inevitably passes longitudinally relative to the longitudinal axis of the side pieces and laterally relative to the longitudinal axis of the end pieces of the door, making it difficult to avoid polishing across the grain, which unfavorably affects finishing. Even when care is taken to coordinate the lumber when the frame is constructed, it is very difficult to obtain the appropriate grain and color that coordinate with the center panel.

The final form of aesthetic shortcoming relates to the decorative pattern traditionally placed on the cupboard door. The frame and center panel must be routed separately, and this limits the selection of patterns useful for the consumer. Obtaining a pattern on the frame that can be extended attractively to the center panel, while not impossible, is difficult.

Means to solve the problems

One major objective of the present invention is to provide a door construction method that maintains high resistance to warping and, on top of that, produces a finished product on which various unrestricted patterns can be routed as a result.

With the present invention, a construction method is obtained that includes first a step for adhering multiple lumber tie plates of roughly the same length together side-by-side where the grain of adjacent lumber pieces is arranged in opposite directions, that secondly includes a step for forming at least one open part that passes across the lumber pieces, and thirdly that includes a step for inserting a spline into the open part, for a door construction method.

Another major objective of the present invention is to provide a door that will maintain high resistance to warping and, on top of that, with which various unrestricted patterns can be routed.

With the present invention, a door board composed of multiple lumber tie plates that are bonded side-by-side to each other is obtained. The grain of adjacent lumber tie plates is arranged in opposite directions, the assembled lumber tie plates have at least one open part that extends across them, where a spline is placed.

Other characteristics of the present invention in addition to those above will become apparent from the following explanation that cites the attached figures.

Application example

A preferred embodiment of the present invention will be explained below related to Figures 1-8. Three door construction methods that can be implemented commercially will be explained. All three methods are interrelated, but slight differences have been developed to satisfy certain specific requirements. The methods to be explained were initially developed with a cupboard door in mind, but the methods can be used to produce doors of different types, so the present invention has even broader application. Regardless of the construction method, the entire door is indicated with reference numeral (10).

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A first method of the door construction methods is shown in Figure 1. This exploded oblique view shows all the component elements of door (10) assembled according to the following steps. First, multiple lumber tie plates (12) are adhered together side-by-side. It is desirable that the lumber tie plates be no more than 63.5 mm (2-1/2 inches wide) and roughly the same length, if possible. It is important that the lumber tie plates be arranged so that the grain of adjacent lumber tie plates will run in opposite directions. The purpose of arranging the grain in opposite directions is so that door (10) will not warp longitudinally. In order to make this circumstance of the present invention more evident, it is conceivable that door (10) have a top part (14) and a bottom part (16). One of the lumber tie plates identified as (18) is adjacent to lumber tie plates (20) on both sides. When the grain of tie plate (18) runs longitudinally toward top part (14) of door (10), the grain of (20) must be arranged to run longitudinally toward bottom part (16). Lumber tie plate (18) has a natural tendency to warp, but this tendency is hindered by adjacent tie plates (20) that are arranged in the opposite direction and thus have a tendency to warp in the opposite direction.

It is desirable that the width of lumber tie plates (12) that constitute door (10) be kept to less than 63.5 mm (2-1/2 inches). The reason for this is that when width exceeds 63.5 mm (2-1/2 inches), there is the risk of the individual tie plates warping laterally.

Second, at least two slots (22) and (24), namely, first slot (22) for top part (14) in lumber tie plates (12) and second slot (24) for bottom end part (16) in lumber tie plates (12), are formed across lumber tie plates (12).

Third, a wooden spline (30) is adhered in each slot (22) and (24). Wooden spline (30) is useful for reinforcing door (10), and door (10) is prevented from warping laterally because of it.

A door (10) produced according to the first of the above-mentioned methods will be explained next.

Door (10) has multiple lumber tie plates (12) that are bonded together side-by-side, and that have a width of no more than 63.5 mm (1-1/2 inches) and roughly equal length and depth. The grain of adjacent lumber tie plates (12) is arranged to face in opposite directions. There is a first arranged slot (22) that extends across them at one end (14) and a second arranged slot (24) that

extends across them at the opposite end (16) in the assembled lumber tie plates (12). A wooden spline (30) is placed in each of aforementioned slots (22) and (24) and, preferably, adhered.

A second method of the door construction methods is shown in Figure 2. This method was developed when it was discovered that when wooden spline (30) used with the first method encounters contraction under certain environmental conditions and is put in place, the aesthetic appearance is therefore affected. What was specifically conceived was a situation in which the material is damp at the time of construction or that the humidity at the assembly location is high.

This second method is composed of the steps explained below. First, preferably, multiple lumber tie plates (12) no more than 63.5 mm (2-1/2 inches) wide and fourthly the same length are adhered together side-by-side.

First, as mentioned in the explanation of the first method, lumber tie plates (12) must be oriented so that the grain of adjacent lumber tie plates is arranged in opposite directions. Second, at least two holes (32) and (32), namely, first hole (32) near top end part (14) of lumber tie plates (12) and second hole (34) near bottom end part (126) of lumber tie plates (12) are formed across lumber tie plates (12). Third, a metal spline (36) is inserted into each hole (32) and (34). Metal spline (36) does not contract, and therefore greater reinforcement than that using wooden spline (30) is achieved. Metal spline (36) can be inserted at a fixed position most easily when it is round, but a metal spline that has a rectangular or triangular cross section can be used with the same results. A round metal spline is preferable for the simple reason that, in order to hold metal splines (36) together and accommodate them with boards, it is easier to produce a round hole than rectangular or triangular ones. Fourth, wooden plugs (38) are inserted into the end parts (40) of holes (32) and (32) and the ends of metal splines (36) are covered by them. Door (10) is more aesthetically pleasing if metal splines (36) are not visible. Wooden plugs (38) are inserted so that they are in the same plane as edge (26) or (28) of door (10).

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Door (10) produced according to the second of the above-mentioned methods will be explained next.

Multiple lumber tie plates (12) no more than 63.5 mm (2-1/2 inches) wide and with roughly the same length and depth are adhered together side-by-side. Adjacent lumber tie plates (12) are arranged so that the grain of adjacent tie plates will run in opposite directions. Each lumber tie plate (12) has a first hole (32) that extends across it near one end (14) and a second hole (34) that extends across it at the opposite end (16). The holes in each tie plate are made so that the assembled door is provided with holes aligned extending across both the top part and bottom part. A metal spline (36) is placed in each hole (32) and (34). Wooden plugs (38) are placed in the ends (40) of holes (32) and (34), and metal spline (36) is hidden by them.

A third method of the construction methods for door (10) is shown in Figure 3. This method was developed to replace the production method using wooden plugs (38) which is

considered as encompassing a detailed operation requiring significant effort. This third method is composed of the steps that will be explained next. First, preferably, multiple lumber tie plates (12) no more than 63.5 mm (2-1/2 inches) wide and that have roughly the same length are adhered together side-by-side. As mentioned in the explanations of the first and second methods, lumber tie plates (12) must be assembled so that the grain of adjacent lumber tie plates (12) is arranged in opposite directions. Secondly, at least two holes (32) and (34), namely, first hole (32) near top end part (14) of lumber tie plates (12) and second hole (34) near bottom end part (16) of lumber tie plates (12) are formed across lumber tie plates (12). Third, a metal spline (36) is inserted into each hole (32) and (34). Fourth, an additional lumber tie plate (42) of the same width and length is adhered along edges (26) and (28) of door (10). There is a stop hole (44) in lumber tie rods (12). It accepts metal spline (36) matched with end parts (40) of holes (32) and (34), and it is hidden by them. In this construction method, metal splines (36) must be extended into stop holes (44) to provide the desired reinforcement.

A door (10) produced according to the third of the above-mentioned methods will be explained next. Door (10) has multiple lumber tie plates (12) that are adhered together side-by-side and, preferably, a width of no more than 63.5 mm (2-1/2 inches) and roughly the same length and depth. The lumber tie plates are assembled so that the grain of adjacent tie plate is arranged in opposite directions. Lumber tie plates (12) have a first hole (32) that extends across them near one end (14) and a second hole (34) that extends across them near the opposite end (16). The assembled lumber tie plates therefore produce a door that has aligned holes that extend across it near both the top part and the bottom part. A metal spline (36) is placed in each hole (32) and (34). There is a stop hole (44) in tie plate (42), along edges (26) and (28), that is matched with end parts (40) of holes (32) and (34) and that houses and hides metal spline (36).

The major commercial benefit provided by the above-mentioned methods is that taking into account the forming of patterns in door (10) is sufficiently realized for the first time. A method for forming patterns on door (10) is shown in Figures 4-8. For the purpose of explanation, a door that has not yet been patterned, but is provided with a finish and is polished, is called a "semi-finished door product." While semi-finished door products are mechanically complete doors, they have not been provided with a pattern that increases their aesthetic appeal, and thus their commercial value. To place a pattern on a door, the steps explained below are desirable. First, one side (46) of door (10) has a finish applied such as stain, paint or lacquer, it is then polished, and thus a semi-finished door product (48) is produced. It can be seen that when a door (10) is constructed using any one of the methods explained, the grain will all run longitudinally. The polishing process is simplified by the grain all running longitudinally and a finish will be possible that is far superior to what was provided previously using a door with a frame type explained as the

prior art background. Second, a template (50) that has guide groove (52) is attached to side (51) of semi-finished door product (48) on the opposite side from polished side (46).

Template (50) can be produced in various unrestricted patterns. The pattern is delineated by guide groove (52) positioned on side (53) of template (50). The method of attaching semi-finished door product (48) to the template (50) is shown in Figures 4 and 5. Template (50) is produced to the same width and length as semi-finished door product (58). Multiple triangular projections (54) are attached to edge (56) of template (50) to prevent shifting between template (50) and semi-finished door product (48). Third, semi-finished door product (48) and template (50) are placed on router (58) so that guide pin (60) that projects upward from table (62) of router (58) locks into guide groove (50) of template (50). Fourth, guide pin (60) remains in guide groove (52), and because of this, semi-finished door product (48) is moved so that the pattern delineated by guide groove (52) of template (50) is reproduced on semi-finished door product (48) by cutter (64) of router (58).

Here, lumber tie plates of approximately equal length and width were mentioned, but it is understandable that lumber tie plates of unequal length and width may be expected. If the assembled cupboard door is rectangular or square as in regular applications, the lumber tie plates that constitute the cupboard will be equal length. Depending on the assembly technology in use, it should be understood that the tie plates are cut to equal length beforehand or they can be cut to a specific length after they are adhered together side-by-side. For more decorative applications, it is conceivable that assembled doors having outlines with a curved top and bottom, or diamond shaped, triangular or even more unusual shapes will be desirable. Clearly, in the case of this type of application, the lumber tie plates are not of equal length. In the same way, cases in which special patterns that can be accomplished by assembling lumber tie plates that have different thicknesses are also possible. In such cases, the tie plates are not of equal depth.

In addition, this disclosure is associated with the use of splines at both the top and bottom parts of the assembled door. However, it should be understood that producing a door such that only a single spline is used, and, for example, it is placed in the center between the top part and bottom part falls within the scope of the present invention. This type of structure can be used when the door is short or when a shape other than a rectangle is used.

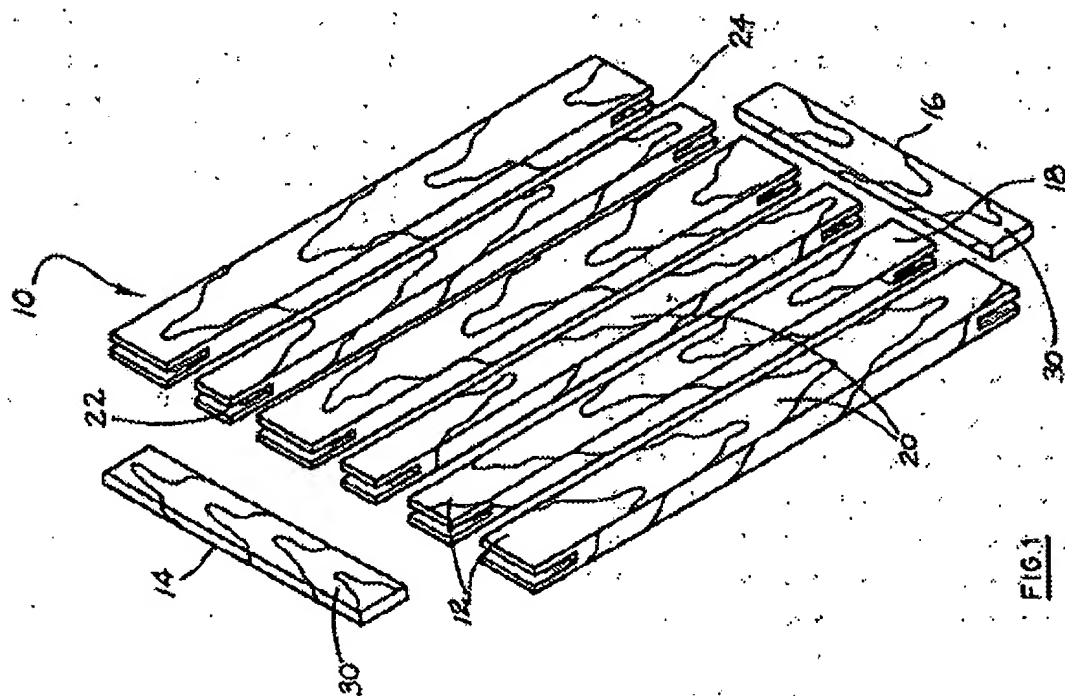
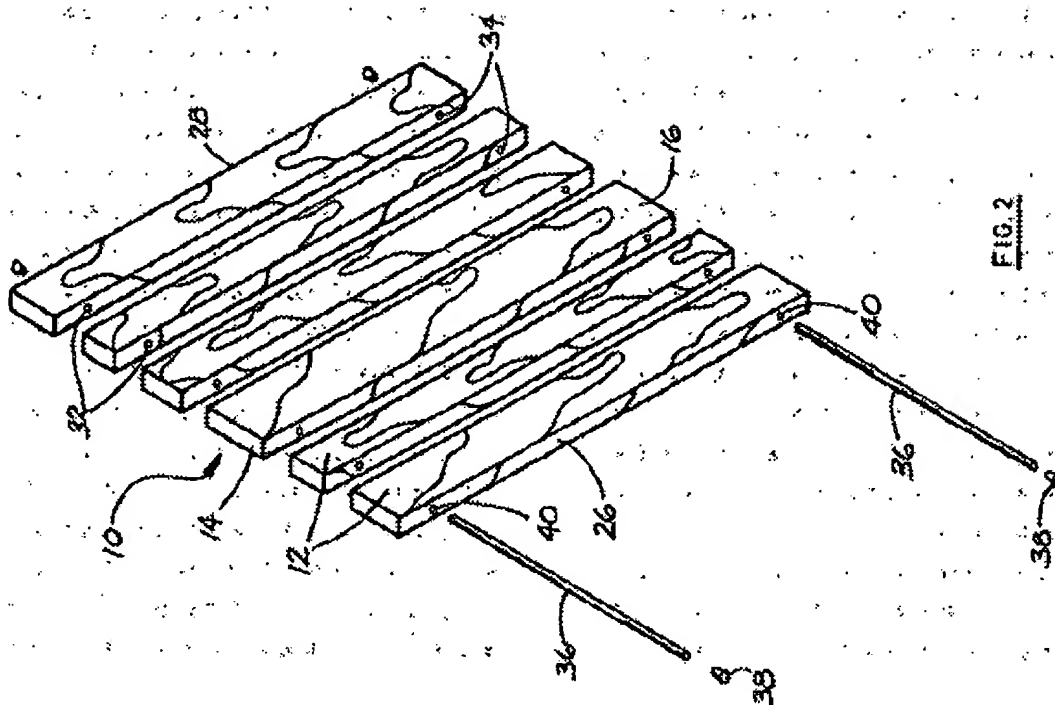
The present invention was explained in detail associated with specific application examples, but it should be understood that other variations are possible that do not stray from the spirit and scope of the present invention.

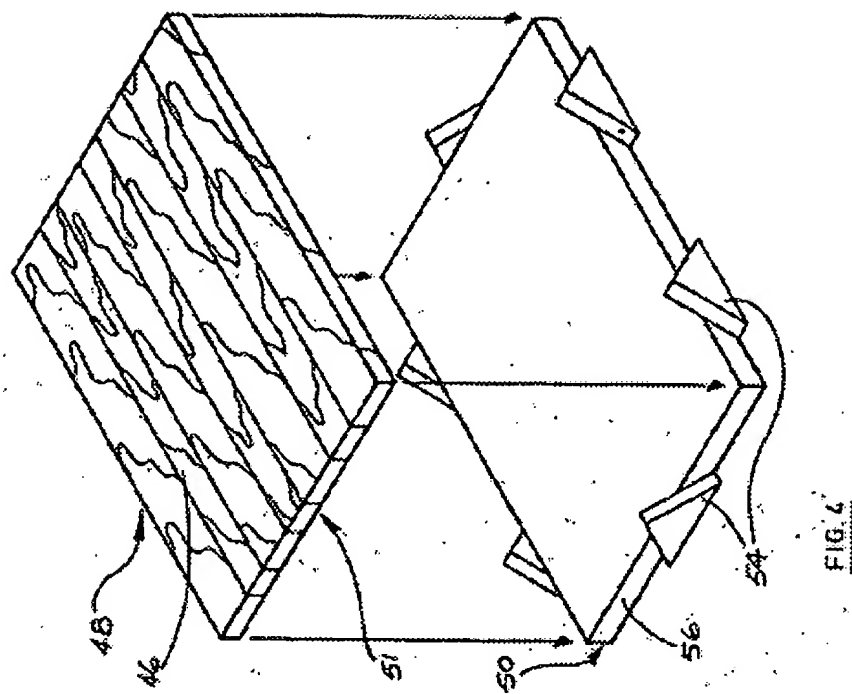
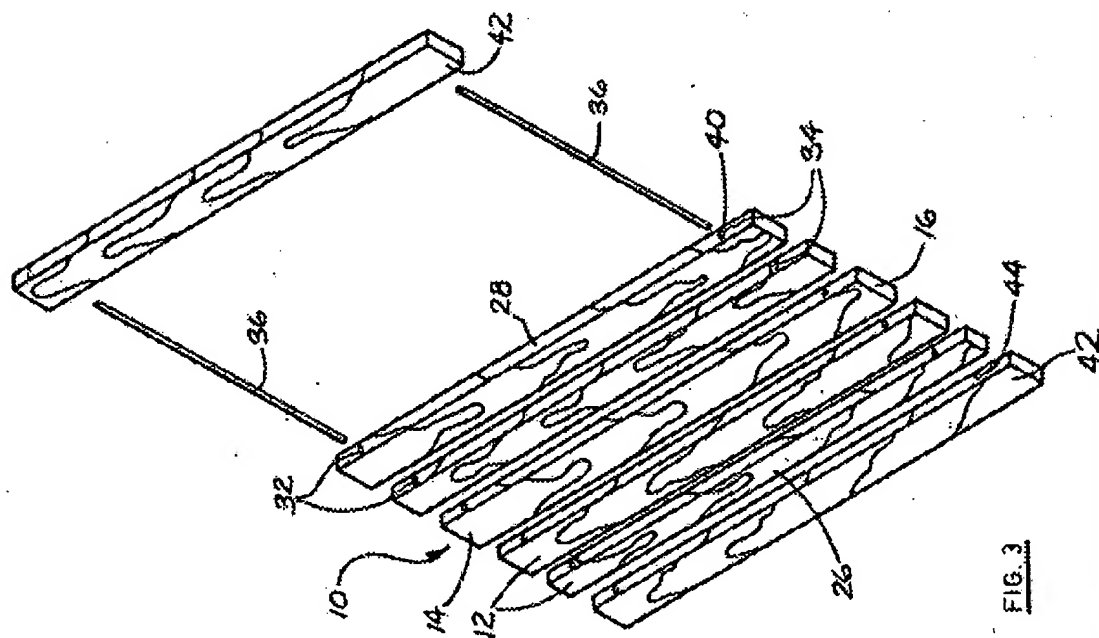
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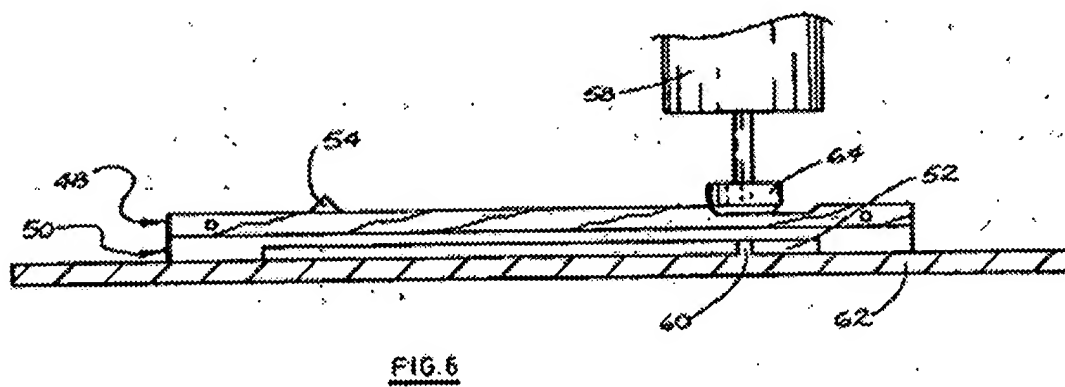
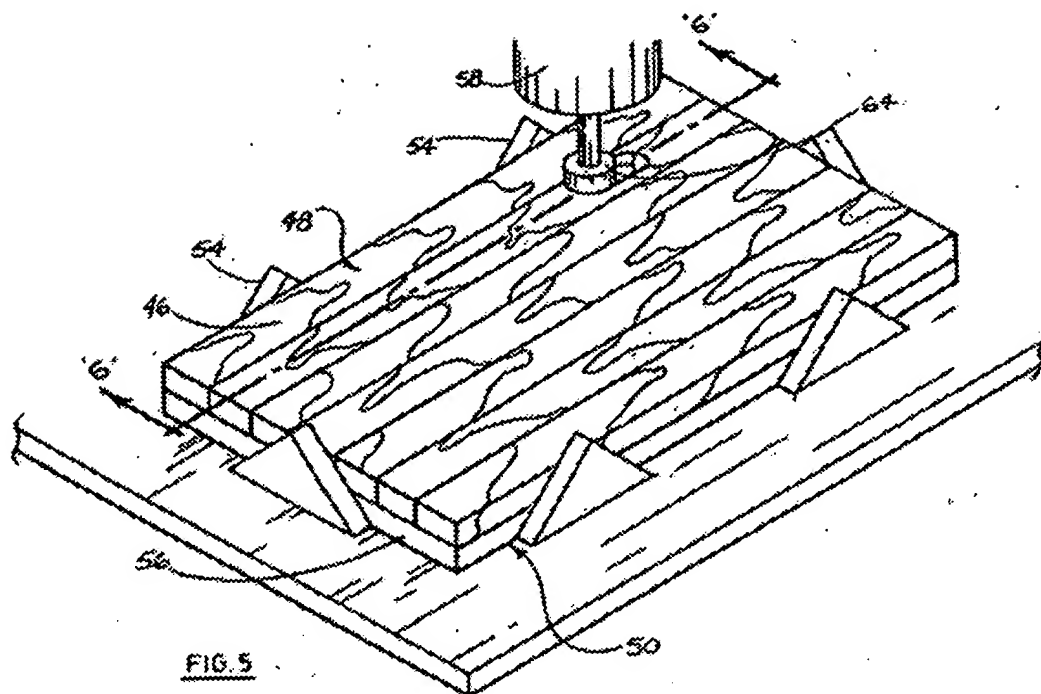
Figure 1 is an exploded oblique view of one form of preferred embodiment of the present invention. Figure 2 is an exploded oblique view of a second form of preferred embodiment of the

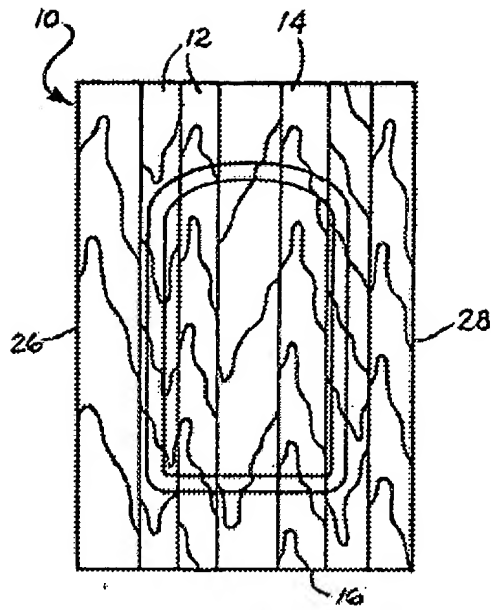
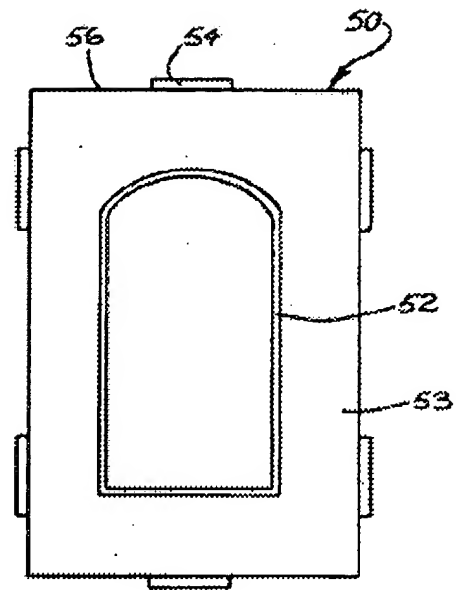
present invention. Figure 3 is an exploded oblique view of a third form of preferred embodiment of the present invention. Figure 4 is an oblique view of a preferred embodiment of the present invention and of a template. Figure 5 is an oblique view of a preferred embodiment of the present invention and a template on a router. Figure 6 is a cross section of a preferred embodiment of the present invention for cut line 6-6 in Figure 5. Figure 7 is a plan view of the front surface of a preferred embodiment of the present invention. Figure 8 is a plan view of the back side of a template used to produce a pattern for a preferred embodiment of the present invention.

(10):	Door	(51), (46):	Side
(12), (42):	Tie plate	(48):	Semi-finished door product
(22), (24):	Slot	(50):	Template
(26), (28):	Edge	(52):	Guide groove
(30):	Wooden spline	(58):	Router
(32), (34):	Hole	(60):	Guide pin
(36):	Metal spline	(62):	Table
(38):	Wooden plug	(64):	Cutter
(42):	Stop hole		







FIG. 7FIG. 8